

FACET



Purpose:

Provide a flexible simulation environment with rapid prototyping capability for exploring new Air Traffic Management (ATM) concepts.

Users:

- NASA & FAA
- CSC
- M.I.T.
- Northwest Airlines
- Raytheon
- Volpe
- Small Businesses

Capabilities:

- Airspace modeling over the entire U.S.
- ETMS/ASDI data interface
- Weather (RUC-2, CCFP, CIWS, NOWRAD and NCWF) data interfaces and processing
- Trajectory synthesis using round-earth equations
- Navigation using flight-plan or direct or wind-optimal routing
- Performance modeling for 500+ aircraft types
- Airspace complexity prediction using dynamic density
- Aircraft self-separation using airborne conflict detection and resolution (CD&R) methods
- System wide impact assessment of traffic flow management constraints
- 3D traffic flow visualization capabilities
- Runs on a desktop computer

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Future ATM Concepts Evaluation Tool



Description

FACET is an Air Traffic Management (ATM) modeling and simulation capability being developed at NASA Ames Research Center. The purpose of FACET is to provide an environment for the development and evaluation of advanced ATM concepts. FACET research is supported by NASA's Airspace Systems Program.

FACET is capable of modeling system-wide airspace operations over the United States. Airspace models (e.g., Center/sector boundaries, airways, SUAs, navigation aids /fixes and airports) are available from databases. Weather models (winds, temperature, severe weather cells, etc.) are also available. A core capability of FACET is the modeling of aircraft trajectories. Using round-earth kinematic equations, aircraft can be flown along either flight plan routes, direct routes or wind-optimal routes as they climb, cruise and descend according to their individual aircraft-type performance models. Performance parameters (e.g., climb/descent rates and speeds, cruise speeds) are obtained from data table lookups. Heading and airspeed dynamics are also modeled.

The design of FACET strikes an appropriate balance between flexibility and fidelity. FACET is hierarchically compatible with the Center-TRACON Automation System (CTAS) and the Airspace Concepts Evaluation System (ACES) in terms of scope and fidelity. The national-level flexible modeling capabilities of FACET complement both the mixed-fidelity gate-to-gate modeling capabilities of ACES and the Center-level high-fidelity modeling capabilities of CTAS.

FACET has been designed with a modular software architecture to facilitate rapid integration of new ATM concepts. The software is written in "Java" and "C" programming languages. It is platform independent, and can be run on a variety of computers.

Applications

Several advanced ATM concepts are implemented in FACET: aircraft self-separation; prediction of aircraft demand and sector congestion; system-wide impact assessment of traffic flow management constraints and wind-optimal routing.

